AGRONOMY IN SPATE IRRIGATION
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Traditionally Spate irrigation supports low value agriculture:

- Uncertainties in timing, number and sizes of floods
- Damage to irrigation structures
- High risk of crop failure

But there is variation ----

- Have high value – taste, preferences, multipurpose, environmental value, Inputs, organic
Farmers developed several cropping strategies:

- Crop choice determined by timing and volume of irrigation
- Moisture conservation
- Preference for local varieties
- If crop fails, use for fodder
- Intercropping
Preference for deep rooting (+3 meter) crops, such as oilseeds, cotton and sorghum.
Crop yields

Wide range of yields attributed to:

- Unreliability of irrigation
- Degree of control over flows – water distribution system
- Farming skills
- Shortage of labour and draught animals – affects moisture conservation
Comparing yields of crops irrigated by spate-only.

<table>
<thead>
<tr>
<th>Kg/ha</th>
<th>Yemen (Kg/ha)</th>
<th>Pakistan (Kg/ha)</th>
<th>Eritrea (Kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorghum (grain)</td>
<td>400-2500</td>
<td>400-550</td>
<td>800-5000</td>
</tr>
<tr>
<td>Cotton</td>
<td>350-3500</td>
<td>360-620</td>
<td>200-1000</td>
</tr>
<tr>
<td>Millet</td>
<td>500-1000</td>
<td>200-900</td>
<td></td>
</tr>
<tr>
<td>Sesame</td>
<td>200-500</td>
<td>150-350</td>
<td>200-800</td>
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Considerable scope for increased crop yields in spate irrigation
SORGHUM YIELDS IN EASTERN LOWLANDS OF ERITREA REACH 5 TON/HA DUE TO PREVAILING IRRIGATION AND MOISTURE CONSERVATION STRATEGIES

ELSEWHERE SORGHUM YIELDS ARE 0.5-1.5 TON/HA
IN IRRIGATION IMPROVEMENT PROJECT (ZABID AND TUBAN)
SUBSTANTIAL YIELD INCREASES WERE OBTAINED
- EXTRA PRODUCTION TWICE VALUE OF EXTRA COSTS

APPLICATION OF FERTILIZER:
100 KG UREA AND 50 SUPERPHOSPHATE/HA
INCREASED YIELD 36-147%
FROM 400 TO 950 KG/HA

SEED TREATMENT AND
INTRODUCTION OF
NEW VARIETIES – NOW
30% AFFECTED BY SMUT
Similarly, in irrigation improvement projects, substantial yield increases (30 to 70%) were obtained in cotton – return to investment factor 2 to 7.

Use of high quality seed, fertilizer application, row planting, timely weeding.

Pest control:
Tow spraying
Early spraying 1-1.5 month after planting and prior to flowering.
Planting density

The amount of water plants use depends on:

- Quantity of soil moisture
- Root-growth rate
- Extent of root development
Advantages high-density planting

- Can be thinned and used as fodder
- Reduction of plant population is no problem
- Weed suppression
Disadvantages high-density planting

- Moisture, nutrients and light competition
- More affected by drought
- Low yield
Use of fertilizer

- Floods carry fertile sediment
- Example 1 meter flood in Yemen contains per ha 0.92 kg nitrogen; 0.01 kg phosphate and 11 kg potass
- Composition/ nutrient depends with origin of flood
- Yield increase if chemical or organic fertilizer is used – 30 to 75 percent
- But local cultivars often less responsive to fertilizer
Seeds

Local varieties are used, as they are adapted to the local agro-climatic conditions and social preferences and local priorities.

Yet sometimes seed stock is degenerated.
Example – local priorities in evaluating sorghum varieties in Sheeb, Eritrea

- Germination rate
- Vulnerability to pest and diseases
- Vulnerability to water stress
- Uniformity in emergence
- Uniformity in size
- Panicle size and yield
- Thickness of stalk
- Palatability of stalk
- Colour
- Ease of grinding it with stone
Pests, diseases and weed

Impact of pests and diseases can be dramatic
Use of pesticides and insecticides is rare, due to limited credit
Solution:
If possible, change sowing dates
Careful and timely use of pesticides
Livestock

Some spate system produced very important breeds - for instance Bagh Nari or Red Sindh cattle.

Production of fodder has high priority. Number of cattle proportionate to amount of fodder.

Much scope to introduce higher quality livestock in many areas, better disease control and improved fodder.
Livestock

Essential role of Women

Use of livestock:

- Tilling land
- Construction and maintenance of structures and field bunds
- Transport
- “Money deposit” (buy in good year, sell in bad year)
- Experience and technology sharing
Recommendations

Spate irrigation often forgotten in agronomy development programmes
But high potential:
- Improved practices existing crops
- Promising new crops
Potential to increase production from better crop management often higher than scope for better water control
Registration and patient rights – Extar value/prices
Agricultural extension, training and research

Recommendation: Improve the quality and reach of public and private extension services in spate irrigated areas